The listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. **(currently amended)** A method of manufacturing an optical waveguide preform, said method comprising:

providing, ~~in a pulse,~~ a first ~~doping~~ gaseous atmosphere including a first halogen-containing gas to a soot preform contained in a vessel, the first halogen-containing gas being selected from the group consisting of $SiF_4$, $SF_6$, $CF_4$, $C_2F_6$, $COF_2$, $C_2F_2Cl_2$, and $F_2$;

~~holding~~ contacting the soot perform with the first ~~doping~~ gaseous atmosphere in the vessel, and maintaining the first ~~doping~~ gaseous atmosphere between 1100 and 1300 °C, for a first reacting time sufficient to at least partially dope the soot preform ~~wherein said pulse comprises a flow of the first doping atmosphere into the vessel which is interrupted prior to the first reacting time~~, wherein the first halogen-containing gas has a partial pressure which decreases during the first reacting time, wherein no more than 0.5 slpm of the first ~~doping~~ gaseous atmosphere flows out of the vessel during the first reacting time, and wherein the first ~~doping~~ gaseous atmosphere is pressurized to a gage pressure of at least 0.1 atm gage during the first reacting time;

evacuating at least a portion of the first ~~doping~~ gaseous atmosphere from the vessel;

at least partially refilling the vessel with a second ~~doping~~ gaseous atmosphere including a second halogen-containing gas, the second halogen-containing gas being selected from the group consisting of $SiF_4$, $SF_6$, $CF_4$, $C_2F_6$, $COF_2$, $C_2F_2Cl_2$, and $F_2$; and

~~holding~~ contacting the soot perform with the second ~~doping~~ gaseous atmosphere in the vessel, and maintaining the second ~~doping~~ gaseous atmosphere between 1100 and 1300 °C, for a second reacting time sufficient to further dope the soot preform, wherein the second halogen-containing gas has a partial pressure which decreases during the second reacting time, and wherein the second ~~doping~~ gaseous atmosphere is pressurized to a gage pressure of at least 0.1 atm gage during the second reacting time ;

wherein the soot perform is retained in the vessel throughout and between: the step of contacting the soot preform with the first gaseous atmosphere, the step of evacuating at least a portion of the first gaseous atmosphere, the step of at least partially refilling the vessel with the second gaseous atmosphere, and the step of contacting the soot preform with the second gaseous atmosphere.

2. **(currently amended)** The method of Claim 1 further including, following said step of ~~holding~~ contacting the soot perform with the second ~~doping~~ gaseous atmosphere:

at least partially refilling the vessel with a third ~~doping~~ gaseous atmosphere including a third halogen-containing gas; and

~~holding~~ contacting the soot perform with the third ~~doping~~ gaseous atmosphere in the vessel for a third reacting time sufficient to further dope the soot preform~~.~~, wherein the third halogen-containing gas has a partial pressure which decreases during the third reacting time, wherein the soot perform is retained in the vessel throughout and between: the step of contacting the soot preform with the second gaseous atmosphere, the step of at least partially refilling the vessel with the third gaseous atmosphere, and the step of contacting the soot preform with the third gaseous atmosphere.

3. **(currently amended)** The method of Claim 1 including depressurizing the first ~~doping~~ gaseous atmosphere about the soot preform at the end of the first reacting time.

4. **(canceled)**

5. **(canceled)**

6. **(canceled)**

7. **(currently amended)** The method of Claim 1 wherein an inert gas is added to the atmosphere in the vessel during and between said steps of ~~holding~~

contacting the soot perform with the first ~~doping~~ gaseous atmosphere and ~~holding~~ contacting the soot perform with the second ~~doping~~ gaseous atmosphere.

8. **(previously presented)** The method of Claim 1 wherein a fluorine-containing gas selected from the group consisting of $SiF_4$, $SF_6$, $CF_4$, $C_2F_6$, $COF_2$, $C_2F_2Cl_2$, and $F_2$ is added to the atmosphere in the vessel during at least one of the first and second reacting times.

9. **(currently amended)** The method of Claim 1 further including the step of at least partially purging the vessel prior to said step of at least partially refilling the vessel with the second ~~doping~~ gaseous atmosphere.

10. **(currently amended)** The method of Claim 1 wherein:

each of the first and second ~~doping~~ gaseous atmospheres includes a dopant gas; and

additional dopant gas is added to the atmosphere in the vessel during at least one of the first and second reacting times to compensate for reductions in the partial pressure of the dopant gas resulting from reaction of the dopant gas with the soot preform.

11. **(original)** The method of Claim 1 including pressurizing an outer surface of the vessel to offset pressurization within the vessel.

12. **(original)** The method of Claim 1 including supporting a reinforcing sleeve about the vessel during at least the first and second reacting times.

13. **(original)** The method of Claim 1 including rotating the soot preform relative to the vessel and wherein the vessel is sealed.

14. **(currently amended)** The method of Claim 1 including:

drying the soot preform prior to said step of providing the first ~~doping~~ gaseous atmosphere; and

sintering the soot preform following the second reacting time.

15. **(canceled)**

16. **(canceled)**

17. **(currently amended)** The method of Claim 1 including:

wherein the first ~~doping~~ gaseous atmosphere ~~is pressurized to~~ has a first pressure during the first reacting time; and

wherein the second ~~doping~~ gaseous atmosphere ~~is pressurized to~~ has a second pressure during the second reacting time;

wherein the second pressure is different than the first pressure.

18. **(currently amended)** The method of Claim 1 including increasing a total pressure of the first ~~doping~~ gaseous atmosphere in the vessel during the first reacting time.

19. **(original)** The method of Claim 1 wherein the first reacting time is between about 1 and 60 minutes.

20. **(original)** The method of Claim 1 wherein the second reacting time is between about 1 and 60 minutes.

21. **(original)** The method of Claim 1 wherein the second reacting time is longer than the first reacting time.

22. **(canceled)**

23. **(currently amended)** The method of Claim 1 including:

heating the first ~~doping~~ gaseous atmosphere to a first temperature during the first reacting time; and

heating the second ~~doping~~ gaseous atmosphere to a second temperature during the second reacting time;

wherein the second temperature is different from the first temperature.

24. **(canceled)**

25. **(canceled)**

26. **(canceled)**

27. **(canceled)**

28. **(canceled)**

29. **(currently amended)** The method of Claim 1 wherein the first and second ~~doping~~ gaseous atmospheres each include an inert gas selected from the group consisting of He, Ar, Ne, and $N_2$.

30. **(currently amended)** A method of manufacturing an optical waveguide preform, said method comprising:

providing~~, in a pulse,~~ a first ~~doping~~ gaseous atmosphere to a soot preform contained in a vessel, the first ~~doping~~ gaseous atmosphere including a fluorine-containing gas selected from the group consisting of $SiF_4$, $SF_6$, $CF_4$, $C_2F_6$, $COF_2$, $C_2F_2Cl_2$, and $F_2$;

~~holding~~ contacting the soot perform with the first ~~doping~~ gaseous atmosphere in the vessel, and maintaining the first ~~doping~~ gaseous atmosphere between 1100 and 1300 °C, for a first reacting time of between about 1 and 60 minutes to at least partially dope the soot preform ~~wherein said pulse is interrupted prior to the first reacting time~~, wherein the first fluorine-containing gas has a partial pressure which decreases during the first reacting time, wherein no more than 0.5 slpm of the first ~~doping~~ gaseous atmosphere flows out of the vessel during the first reacting time, and wherein the first ~~doping~~ gaseous atmosphere is pressurized to a gage pressure of at least 0.1 atm gage during the first reacting time; ~~and~~

evacuating at least a portion of the first ~~doping~~ gaseous atmosphere from the vessel at the end of the first reacting time ; then

at least partially refilling the vessel with a second gaseous atmosphere, the second gaseous atmosphere including a fluorine-containing gas selected from the group consisting of $SiF_4$, $SF_6$, $CF_4$, $C_2F_6$, $COF_2$, $C_2F_2Cl_2$, and $F_2$; and

contacting the soot perform with the second gaseous atmosphere in the vessel, and maintaining the second gaseous atmosphere between 1100 and 1300 °C, for a second reacting time sufficient to further dope the soot preform, wherein the second fluorine-containing gas has a partial pressure which decreases during the second reacting time, and wherein the second gaseous atmosphere is pressurized to a gage pressure of at least 0.1 atm gage during the second reacting time;

wherein the soot perform is retained in the vessel throughout and between: the step of contacting the soot preform with the first gaseous atmosphere, the step of evacuating at least a portion of the first gaseous atmosphere, the step of at least partially refilling the vessel with the second gaseous atmosphere, and the step of contacting the soot preform with the second gaseous atmosphere .

31. **(canceled)**

32. **(currently amended)** The method of Claim 30 including depressurizing the first ~~doping~~ gaseous atmosphere about the soot preform at the end of the first reacting time.

33. **(currently amended)** The method of Claim 32 wherein the vessel is substantially completely gas-sealed throughout both of said ~~holding step~~ contacting steps.

34. **(currently amended)** The method of Claim 32 further including, following said step of depressurizing the doping atmosphere:

replacing at least a portion of the first ~~doping~~ gaseous atmosphere with a second ~~doping~~ gaseous atmosphere about the soot preform, the second ~~doping~~ gaseous atmosphere being selected from the group consisting of $SiF_4$, $SF_6$, $CF_4$, $C_2F_6$, $COF_2$, $C_2F_2Cl_2$, and $F_2$; and

pressurizing the second ~~doping~~ gaseous atmosphere about the soot preform, and maintaining the second ~~doping~~ gaseous atmosphere between 1100 and 1300 °C, for a second reacting time of no more than 60 minutes to further dope the soot preform.

35. **(currently amended)** The method of Claim 34 wherein said step of pressurizing the second ~~doping~~ gaseous atmosphere includes pressurizing the second ~~doping~~ gaseous atmosphere to a gage pressure of at least 0.1 atm.

36. **(currently amended)** The method of Claim 35 wherein said step of pressurizing the second ~~doping~~ gaseous atmosphere includes pressurizing the second ~~doping~~ gaseous atmosphere to a gage pressure of at least 0.5 atm.

37. **(original)** The method of Claim 34 wherein the second reacting time is between about 5 and 30 minutes.

38. **(currently amended)** The method of Claim 34 wherein said step of pressurizing the second ~~doping~~ gaseous atmosphere includes heating the second ~~doping~~ gaseous atmosphere to a temperature of between about 1125 and 1300 °C.

39. **(currently amended)** The method of Claim 30 including pressurizing an outer surface of the vessel to offset pressurization ~~of the doping atmosphere~~ within the vessel.

40. **(original)** The method of Claim 30 including rotating the soot preform relative to the vessel.

41. **(currently amended)** The method of Claim 30 including:

drying the soot preform prior to said step of providing the first ~~doping~~ gaseous atmosphere; and

sintering the soot preform following the first reacting time.

42. **(canceled)**

43. **(canceled)**

44. **(currently amended)** The method of Claim 30 ~~including pressurizing~~ wherein the first ~~doping~~ gaseous atmosphere ~~to~~ has a gage pressure of at least 0.5 atm gage.

45. **(currently amended)** The method of Claim 30 wherein the first reacting time is between about 5 and 30 minutes.

46. **(canceled)**

47. **(canceled)**

48. **(canceled)**

49. **(canceled)**

50. **(canceled)**

51. **(currently amended)** A method of manufacturing an optical waveguide preform, said method comprising:

flowing ~~a pulse of~~ a process gas into a vessel to provide a ~~doping~~ gaseous atmosphere in the vessel about a soot preform, the process gas including a ~~doping~~ first gas selected from the group consisting of $SiF_4$, $SF_6$, $CF_4$, $C_2F_6$, $COF_2$, $C_2F_2Cl_2$, and $F_2$;

~~maintaining~~ contacting the soot preform ~~in contact~~ with the ~~doping~~ gaseous atmosphere, and maintaining the ~~doping~~ gaseous atmosphere between 1100 and 1300 °C, for a reacting time sufficient to at least partially dope the soot preform ~~wherein said pulse is interrupted prior to the reacting time~~, wherein the first gas has a partial pressure which decreases during the reacting time, wherein no more than 0.5 slpm of the ~~doping~~ gaseous atmosphere flows out of the vessel during the reacting time, and wherein the ~~doping~~ gaseous

atmosphere is pressurized about the soot preform to ~~a doping pressure~~ greater than ambient pressure during the reacting time; and

evacuating at least a portion of the ~~doping~~ gaseous atmosphere from the vessel at the end of the reacting time.

52. **(previously presented)** The method of claim 51 further including flowing a makeup gas into the vessel during the reacting time.

53. **(currently amended)** The method of claim 52 wherein the flow rate of the makeup gas is provided to at least partially offset for any pressure loss due to the ~~doping~~ first gas reacting with the preform.

54. **(canceled)**

55. **(canceled)**

56. **(currently amended)** The method of claim 51 including flowing ~~a second pulse of the~~ an additional amount of the process gas into the vessel to form a second ~~doping~~ gaseous atmosphere in the vessel about the soot preform following said step of evacuating at least a portion of the ~~doping~~ gaseous atmosphere from the vessel, wherein the soot perform is retained in the vessel throughout and between the step of flowing the process gas into the vessel, the step of contacting the soot preform with the gaseous atmosphere, the step of evacuating at least a portion of the gaseous atmosphere, and the step of flowing an additional amount of the process gas into the vessel .

57. – 131 **(canceled)**

132. **(currently amended)** A method of manufacturing an optical waveguide preform, said method comprising:

providing a soot preform contained in a vessel;

adding a quantity of a first ~~doping~~ gas to the vessel to provide a first ~~doping~~ gaseous atmosphere to the soot preform, the first ~~doping~~ gas being selected from the group consisting of $SiF_4$, $SF_6$, $CF_4$, $C_2F_6$, $COF_2$, $C_2F_2Cl_2$, and $F_2$;

contacting the soot preform with the first ~~doping~~ gaseous atmosphere within the vessel, and maintaining the first ~~doping~~ gaseous atmosphere between 1100 and 1300 °C, for a first reacting time sufficient to at least partially dope the soot preform, wherein the first gas has a partial pressure which decreases during the first reacting time, wherein the first ~~doping~~ gaseous atmosphere is pressurized to a first ~~doping~~ pressure greater than ambient pressure, and wherein no more than 0.5 slpm of the first ~~doping~~ gaseous atmosphere flows out of the vessel during the first reacting time; then

adding a quantity of a second ~~doping~~ gas to the vessel to provide a second ~~doping~~ gaseous atmosphere to the soot preform, the second ~~doping~~ gas being selected from the group consisting of $SiF_4$, $SF_6$, $CF_4$, $C_2F_6$, $COF_2$, $C_2F_2Cl_2$, and $F_2$; and

contacting the soot preform with the second ~~doping~~ gaseous atmosphere within the vessel, and maintaining the second ~~doping~~ gaseous atmosphere between 1100 and 1300 °C, for a second reacting time sufficient to at least partially dope the soot preform, wherein the second gas has a partial pressure which decreases during the second reacting time, wherein the second ~~doping~~ gaseous atmosphere is pressurized to a second ~~doping~~ pressure greater than ambient pressure, and wherein no more than 0.5 slpm of the second ~~doping~~ gaseous atmosphere flows out of the vessel during the second reacting time ;

wherein the soot perform is retained in the vessel throughout and between the step of adding a quantity of a first gas, the step of contacting the soot perform with the first gaseous atmosphere, the step of adding a quantity of a second gas, and the step of contacting the soot perform with the second gaseous atmosphere.

133. **(previously presented)** The method of claim 132 wherein the vessel is sealed gas-tight throughout the first reacting time.

134. **(previously presented)** The method of claim 133 wherein the vessel is sealed gas-tight throughout the second reacting time.

135. **(currently amended)** The method of claim 132 wherein at least a portion of the first ~~doping~~ gaseous atmosphere is evacuated from the vessel at the end of the first reacting time.

136. **(currently amended)** The method of claim 132 wherein at least a portion of the second ~~doping~~ gaseous atmosphere is evacuated from the vessel at the end of the second reacting time.

137. **(currently amended)** The method of claim 132 wherein no more than 0.1 slpm of the first ~~doping~~ gaseous atmosphere flows out of the vessel during the first reacting time.

138. **(currently amended)** The method of claim 132 wherein no more than 0.1 slpm of the second ~~doping~~ gaseous atmosphere flows out of the vessel during the second reacting time.

139. **(new)** A method of manufacturing an optical waveguide preform, said method comprising:

providing a soot preform contained in a vessel;

adding a quantity of a first fluorine-containing gas to the vessel and in contact with the soot preform to provide a first gaseous atmosphere to the soot preform, the first gas being selected from the group consisting of $SiF_4$, $SF_6$, $CF_4$, $C_2F_6$, $COF_2$, $C_2F_2Cl_2$, and $F_2$; then,

sealing the vessel gas-tight and maintaining the soot preform in contact with the first gaseous atmosphere within the vessel, and maintaining the first gaseous atmosphere between 1100 and 1300 °C, for a first reacting time sufficient to at least partially dope the soot preform with the first gas, wherein the first gas has a partial pressure which decreases during the first reacting time as the soot preform is doped with the first gas, wherein the first gaseous atmosphere is pressurized to a first pressure greater than ambient pressure during the first reacting time; then,

evacuating at least a portion of the first gaseous atmosphere from the vessel; then,

adding a quantity of a second fluorine-containing gas to the vessel to provide a second gaseous atmosphere to the soot preform, the second gas being selected from the group consisting of $SiF_4$, $SF_6$, $CF_4$, $C_2F_6$, $COF_2$, $C_2F_2Cl_2$, and $F_2$; then,

sealing the vessel gas-tight and maintaining the soot preform in contact with the second gaseous atmosphere within the vessel, and maintaining the second gaseous atmosphere between 1100 and 1300 °C, for a second reacting time sufficient to at least partially dope the soot preform with the second gas, wherein the second gas has a partial pressure which decreases during the second reacting time as the soot preform is doped with the second gas, wherein the second gaseous atmosphere is pressurized to a second pressure greater than ambient pressure during the second reacting time;

wherein the soot perform is retained in the vessel throughout and between the step of adding a quantity of a first fluorine-containing gas, the step of sealing the vessel gas-tight and maintaining the soot preform in contact with the first gaseous atmosphere, the step of evacuating at least a portion of the first gaseous atmosphere from the vessel, the step of adding a quantity of a second fluorine-containing gas, and the step of sealing the vessel gas-tight and maintaining the soot preform in contact with the second gaseous atmosphere.

140. **(new)** A method of manufacturing an optical waveguide preform, said method comprising:

providing a soot preform contained in a vessel;

adding a quantity of a first fluorine-containing gas to the vessel and in contact with the soot preform to provide a first gaseous atmosphere to the soot preform, the first gas being selected from the group consisting of $SiF_4$, $SF_6$, $CF_4$, $C_2F_6$, $COF_2$, $C_2F_2Cl_2$, and $F_2$; then,

interrupting the adding of the first fluorine-containing gas into the vessel and maintaining the soot preform in contact with the first gaseous atmosphere within the vessel, and maintaining the first gaseous atmosphere between 1100 and 1300 °C, for a first reacting time sufficient to at least partially dope the soot preform with the first gas, wherein the first gas has a partial pressure which decreases during the first reacting time as the soot preform is doped with the first gas, wherein the first gaseous atmosphere is pressurized to a first pressure greater than ambient pressure during the first reacting time; then,

evacuating at least a portion of the first gaseous atmosphere from the vessel; then,

adding a quantity of a second fluorine-containing gas to the vessel to provide a second gaseous atmosphere to the soot preform, the second gas being selected from the group consisting of $SiF_4$, $SF_6$, $CF_4$, $C_2F_6$, $COF_2$, $C_2F_2Cl_2$, and $F_2$; then,

interrupting the adding of the second fluorine-containing gas into the vessel and maintaining the soot preform in contact with the second gaseous atmosphere within the vessel, and maintaining the second gaseous atmosphere between 1100 and 1300 °C, for a second reacting time sufficient to at least partially dope the soot preform with the second gas, wherein the second gas has a partial pressure which decreases during the second reacting time as the soot preform is doped with the second gas, wherein the second gaseous atmosphere is pressurized to a second pressure greater than ambient pressure during the second reacting time;

wherein the soot perform is retained in the vessel throughout and between the step of adding a quantity of a first fluorine-containing gas, the step of interrupting the adding of the first fluorine-containing gas and maintaining the soot preform in contact with the first gaseous atmosphere, the step of evacuating at least a portion of the first gaseous atmosphere from the vessel, the step of adding a quantity of a second fluorine-containing gas, and the step of interrupting the adding of the second fluorine-containing gas and maintaining the soot preform in contact with the second gaseous atmosphere.